

Remarks

Claims 1-38 and 116-125 were pending and examined in the Office Action that was mailed January 29, 2004; claims 71-85 were withdrawn from consideration as being drawn to a non-elected invention. Claims 1-38 and 116-125 were rejected. Claims 120-125 were indicated as being free from the prior art. The present Response cancels claims 71-85 and adds new claims 126 – 132. Each of the objections and rejections raised in the Office Action is addressed individually below.

New Claims

Applicant respectfully submits that new claims 126-132 are supported by the specification as originally filed (see page 12, lines 12-28 and page 13, lines 1-2) and no new matter is contained herein.

Rejections Under 35 U.S.C. § 112

Claims 1-38 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Examiner states that the specification fails to support any non-planar stamp as required by Claim 1. Specifically, Examiner states that the stamp shapes depicted by the Figures and description relating thereto relate to specific non-planar structures and therefore, Examiner concludes that there is not adequate support for “the much broader scope of any non-planar stamp as claimed.”

Applicant has stated that a non-planar stamp is supported by the specification as filed. Specifically Applicant has pointed to the Figures and page 12, line 12 which states that “[w]hile Figure 1 depicts a cylindrical stamp, the stamp may take practically any shape.” Furthermore, Applicant points to page 12, lines 15-28 and page 13, lines 1-9 wherein the specification discloses that the stamp may take on any cross-section, such as an ellipse (page 12, line 17), a polygon (page 12, line 19), a sphere (page 12, line 22), or a variety of other three dimensional figures (page 12, lines 23-24). Applicant submit that the Figures and specification illustrate *some* of the possible embodiments of the non-planar stamp of the present invention. It is simply not feasible to state or illustrate all possible non-planar structures as contemplated by the present claimed invention. “A patent must contain a description that enables one skilled in the art to make and use the claimed invention... An inventor need not, however, explain every detail since he is speaking to those skilled in the art.” In re Howarth, 654 F.2d 103, 105 (C.C.P.A. 1981).

“Not every last detail is to be described, else patent specifications would turn into production specifications, which they were never intended to be.” In re Gay, 309 F.2d 169, 774 (C.C.P.A. 1962). Applicant respectfully submits that the illustration of the non-planar embodiments in the specification and Figures would be understood by one of ordinary skill in the art as exemplary, and provide adequate support to practice the present claimed invention. Accordingly, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 33-36 and 116-128 have been rejected under 35 U.S.C. § 112, first paragraph, as not being enabled for other relationships between a stamp lumen and substrate or a stamp and lumen substrate. Applicant points to Figure 9, page 25, lines 27-29 and page 26, lines 1-4 wherein the channels of the stamp are shown and described to be connected to a fluid source from which fluid may enter the channels, pass through the channels, and exit the stamp via tubing. Applicant respectfully submits that Figure 9 and the specification enables one of ordinary skill in the art to use one embodiment of the claimed invention, wherein the stamp comprises a lumen having a portal providing communication between the lumen and an exterior of the stamp. Applicant therefore respectfully requests that this rejection be reconsidered and withdrawn.

Claims 1-38 and 116-125 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Examiner states that independent Claims 1 and 116 are confusing by not requiring a step of the process to produce a pattern on a surface as required in the claim preamble. Applicant has amended Claims 1 and 116 to include Examiner’s suggested language, --- to produce a pattern on a surface of the substrate---.

Examiner states that the line of demarcation between the form of a stamp that is non-planar and planar is uncertain. Applicant submits that one of ordinary skill in the art would adopt the plain dictionary definition of non-planar and understand the term to mean having a three-dimensional cross-section as opposed to a two-dimensional cross-section. Applicant points to page 12, lines 12-28 and page 13, lines 1-2 wherein the specification defines different shapes of stamps by their cross-section. Applicant therefore respectfully submits that one of ordinary

skill in the art would understand the demarcation between planar and non-planar as a demarcation between two-dimensional and three-dimensional cross-sections.

Examiner states that Claims 36-38 and 116-125 are unclear as to various issues relating to the location of the lumen with respect to the structure of the stamp or substrate. Examiner points out that the specification and drawings illustrate two scenarios: 1) wherein the stamp has a lumen and the substrate is placed inside the stamp's lumen; and 2) wherein the substrate has a lumen and the stamp is placed inside the substrate's lumen. Applicant points to Figure 9, page 25, lines 27-29 and page 26, lines 1-4 wherein the channels of the stamp are shown and described to be connected to a fluid source from which fluid may enter the channels, pass through the channels, and exit the stamp via tubing. Applicant respectfully submits that Figure 9 and the specification, in combination with the remaining Figures and specification, make clear to one skilled in the art different embodiments of the claimed invention, wherein the stamp comprises a lumen having a portal providing communication between the lumen and an exterior of the stamp. Applicant has amended Claims 116 - 125 to clarify that which the Applicant claims. Applicant respectfully submits that the claims are clear how the first lumen of the stamp and substrate, and the second lumen of the substrate and the stamp communicate with one another, to accomplish patterning a surface.

Examiner states that Claims 34 and 118 are confusing by requiring the walls of the stamp defining a lumen to be flat or curved is confusing. Examiner states that it cannot be seen how a lumen can have flat walls since a lumen is circular. Examiner further states that requiring the walls of the lumen to be curved is confusing since the walls of the lumen are inherently curved due to the circular form of a lumen. Applicant respectfully submits however, that a lumen does not have to be circular. A lumen may have flat walls, for example, if the cross-section of the lumen is rectangular. Therefore Applicant respectfully submits that Claims 34 and 118 are clear and requests rejection be withdrawn.

Examiner states that Claims 35 and 119 are unclear as to the relationship of the tube or balloon to the lumen of the stamp of claim 33. Applicant has amended Claims 35 and 119, obviating this rejection.

Examiner states that Claim 38 is uncertain because a substrate being open, partially closed, or closed will be relative and subjective when there is no structure defined that is capable of being open, partially closed or closed. Applicant respectfully submits that one of ordinary skill in the art would understand a substrate being open, partially closed, or closed according to

the claimed invention. For example, the specification discloses the substrate may define an open surface without a lumen, a portion of a sphere or spheroid or include a saddle point (see page 13, lines 4-9). Figure 2 illustrates a stamping method for a curved but open substrate.

In light of the above, Applicant respectfully requests that the written description, enablement and indefiniteness rejections be reconsidered and withdrawn.

Rejections Under 35 U.S.C. § 102

Claims 1-7, 9-11, 30, 31, and 37 were rejected under 35 U.S.C. § 102(b) as being anticipated by Maracas et al. (U.S. Patent No. 5,669,303). Examiner restates that the claims are drawn to a method of patterning a surface by providing a stamp having a stamping surface disposing a substrate proximate to the stamping surface and modulating the dimensions of the stamp to place the stamping surface in contact with the substrate; that Maracas et al. disclose stamping a surface with a flexible stamp by using pressure to cause the flexible stamp to change shape and contact a surface to be stamped; that changing the shape of the flexible stamp of Maracas et al. modulates dimensions of the stamp, and the method of Maracas et al. is the same as presently claimed. Examiner adds that Figure 2 of Maracas et al. illustrates a non-planar stamp since it contains raised and recessed portions and that the stamp of Maracas et al. is non-planar when the flexible stamp bends prior to contact with the surface being stamped. Applicant respectfully disagrees that Maracas et al. is the same as the presently claimed invention.

As amended, independent claim 1 now recites a method of patterning a surface, comprising: providing a non-planar stamp having a stamping surface; disposing a substrate proximate to the stamping surface; and modulating the dimensions of the stamp to place the stamping surface in contact with the substrate.

The methods presently claimed refer to providing a *non-planar* stamp having a three-dimensional cross-section when no force or stress is applied. The dimensions of such a stamp may then be modulated by “applying a mechanical stress or an electrical stimulus, removing a mechanical stress etc.” (see page 4, lines 4-7). The dimensions of the stamp remain three-dimensional, whether or not stress or stimulus is applied.

In contrast, Maracas et al. discloses only *planar* stamps, which are flexed, to place them in contact with the substrate. The planar stamps of Maracas et al. have a two-dimensional cross-section. As depicted in Figure 1 of the Maracas patent, a flexible two-dimensional planar stamp

106, having an outer surface 108 and a stamping surface 110, is placed in contact with an “article” 102 by aligning the stamp with the article and deforming the stamp (column 3, lines 25-30 and column 5, lines 54-59). The planar stamp is deformed using a pressure controlled chamber, which shrinks to place the stamp in contact with the article, commencing at the center of the flexible stamp and proceeding outwardly away from the center (column 5, line 64 to column 5, line 18). Although flexing the stamp puts it in contact with the substrate, the stamp is planar. Similarly, although the stamping *surface* contains raised and recessed portions, the stamp is planar. Maracas et al. does not teach a method that includes a step of providing a non-planar stamp with a three-dimensional cross-section before applying stress or stimuli to the planar stamp.

Anticipation under 35 U.S.C. § 102 requires that the invention disclosed by the prior art reference must be identical to the claimed invention in each and every aspect. As stated in Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367 (Fed. Cir. 1986), “[I]t is axiomatic that for prior art to anticipate under 102 it has to meet every element of the claimed invention.” Nowhere do Maracas et al. disclose a non-planar stamp (i.e., having a three-dimensional cross-section) that can be modulated to place the stamping surface in contact with the substrate as presently claimed. Therefore, the Maracas et al. patent does not anticipate the claimed invention and withdrawal of this rejection under 35 U.S.C. § 102(b) is requested.

Rejections Under 35 U.S.C. § 103

Claims 1-7, 9-13, 24-26, 30-32, 37 and 38 have been rejected under 35 U.S.C. § 103(a) as being obvious over Maracas et al. in view of Whitesides et al. (U.S. Patent No. 6,180,239 B1), and if necessary in further view of Singhvi et al. (U.S. Patent No. 5,776,748). Applicant respectfully disagrees.

In contrast to the general teachings in the cited art, the claimed invention features novel methods for patterning a surface. As recited in independent claim 1, the present invention features a method for patterning a surface, comprising: providing a *non-planar* stamp having a stamping surface; disposing a substrate proximate to the stamping surface; modulating the dimensions of the non-planar stamp to place the stamping surface in contact with the substrate. The Maracas et al. patent lacks any teaching or suggestion of a non-planar stamp, which three-dimensional cross-section can be modulated to place it in contact with a substrate surface. Nor do Whitesides et al. or Singhvi et al. teach or suggest these elements of the claims.

The Maracas et al. patent discloses only planar stamps, which are flexed to place them in contact with a substrate. As depicted in Figure 1 of the Maracas et al. patent, a flexible planar stamp 106, having an outer surface 108 and a stamping surface 110, is placed in contact with an “article” (substrate) 102 (column 3, lines 25-30) by aligning the stamp with the article and deforming the stamp (column 5, lines 54-59). Pressure-controlled contact commences at the center of the flexible stamp and proceeds outwardly away from the center (column 5, line 64 to column 5, line 18). Although flexing the stamp puts the stamp in contact with the substrate, the stamp itself is planar.

Examiner states that Whitesides et al. discloses patterning a surface using a non-planar stamp that can be obtained by deforming a flexible planar stamp so as to be non-planar. Applicant respectfully submits that Whitesides et al. does not disclose, teach or suggest a non-planar stamp having a three-dimensional cross-section, as does the claimed invention. Specifically, the Examiner points to disclosure of Whitesides et al. that states the “[s]tamp in this embodiment is flat, that is, stamping surface defines portions of a plane.” See Whitesides et al. col. 11, lines 9-11. Applicant respectfully submits that Whitesides et al. lacks that same disclosure that Maracas et al. lacks, namely a non-planar stamp with a three-dimensional cross-section. The stamp of the present invention does not need to be deformed by stress or stimuli to a planar stamp to become non-planar. Maracas et al. and Whitesides et al. cannot be combined to make up for a lack of disclosure, teaching or suggestion of a non-planar stamp as claimed by the present invention.

Examiner further points to col. 2, lines 6 and 34 and col. 5, line 25 of Singhvi et al. as suggesting a non-planar stamp. However, Singhvi et al. states that “the method would ideally find use on planar and nonplanar *surfaces*...,” referring to the surfaces of the article to be patterned, rather than the stamp as claimed by the present invention. Applicant therefore respectfully submits that none of these references disclose, teach or suggest, either alone or in combination, the present invention as claimed, and respectfully requests that this rejection be reconsidered and withdrawn.

Claims 8 and 27-29 have been rejected under 35 U.S.C. § 103(a) as being obvious over Maracas et al. in view of Whitesides et al. (U.S. Patent No. 6,180,239 B1), Singhvi et al. (U.S. Patent No. 5,776,748) and further in view of Kumar et al. (U.S. Patent No. 5,512,131). Applicant respectfully disagrees.

As stated above, Applicant respectfully submits that neither Maracas et al., Whitesides et al., nor Singhvi et al. disclose, teach or suggest a non-planar stamp as claimed by the present invention. Kumar et al. similarly does not teach a non-planar stamp as claimed by the present invention. In fact, Kumar et al. teaches away from bending a planar stamp. Specifically, Kumar et al. states that a board or chip may be bent so that auxiliary contacts connect components on different sides of the bend. “All too often these auxiliary contacts are the cause of circuitry failure, and the attempt to move from the two-dimensional domain to the three-dimensional domain fails.” See Kumar et al., column 1, lines 50-59. Applicant respectfully submits that because Kumar et al. teaches away from bending a planar stamp, it cannot be combined with Maracas et al., Whitesides et al. or Singhvi et al. to form an obviousness rejection. Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 14-23, 33-36 and 116-119 have been rejected under 35 U.S.C. § 103(a) as being obvious over Maracas et al. in view of Whitesides et al. (U.S. Patent No. 6,180,239 B1), Singhvi et al. (U.S. Patent No. 5,776,748), Kumar et al. (U.S. Patent No. 5,512,131) and further in view of Anderson et al. (U.S. Patent 6,645,432 B1). Applicant respectfully disagrees.

In contrast to the general teachings in the cited art, the claimed invention features novel methods for patterning a surface. As recited in independent claim 1, the present invention features a method for patterning a surface comprising: providing a non-planar stamp having a stamping surface; disposing a substrate proximate to the stamping surface; modulating the dimensions of the non-planar stamp to place the stamping surface in contact with the substrate.

As stated above, Applicant respectfully submits that neither Maracas et al., Whitesides et al., Singhvi et al. nor Kumar et al. disclose, teach or suggest a non-planar stamp as claimed by the present invention. Anderson et al. similarly does not teach a non-planar stamp as claimed by the present invention. Specifically, Anderson et al. states that it is preferred that when the microfluidic network structures are used as stamps, they should be formed of an elastomeric material, so that the stamping surface of the stamp is able to make contact with a variety of shapes of material surfaces. See Anderson et al., col. 40, lines 12-18. In addition, Anderson et al. does not teach of modulating the dimensions of a non-planar stamp to place the stamping surface in contact with a substrate. Anderson et al. teaches a stamp of elastic surface the forms a “conformal contact” with the material surface. It is the elastic surface of the stamp that forms the

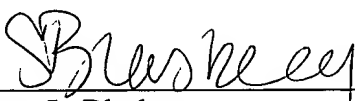
seal between the stamp and the material surface. The Anderson stamp itself is not modulated. See Anderson et al., col. 39, lines 58-68 and col. 40, lines 5-18.

Applicant therefore respectfully submits that none of these references disclose, teach or suggest, either alone or in combination, the present invention as claimed, and respectfully requests that this rejection be reconsidered and withdrawn.

Conclusion

Based on the arguments presented above, it is submitted that the pending claims, including the newly added dependent claims, are allowable over the art of record. Applicant would like to thank the Examiner for his thoughtful comments and careful consideration of the case and requests favorable action. Please charge any fees as may be required, or credit any overpayments, to our Deposit Account No. 03-1721.

Respectfully submitted,



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